

*Advanced Ground Control Station Unit
&
Antenna Tracker*

RVGS

Your Guide To the Ground Station Control and Antenna Tracker Unit

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Introducing RVGS

"I am really happy with my RVGS, I can make my ground station as simple as I like because its "all in one" concept and it is easy to use and configure."

All-in-One ground control station and antenna tracking



What RVGS can Do

RV Antenna tracking provides next features:

* **Receiver Diversity** - when you connect two NTSC or PAL audio/video receivers (of any brand or frequency), the RVGS picks the better signal at any given time, which can greatly reduce video fades and improve your FPV experience! A variety of diversity settings are configurable with the on-board switches and LED indicators.

* **Telemetry** - When coupled with our [RVOSD](#), all video data (not just GPS position) are transmitted to your laptop, PC, via your video transmitter and the RVGS USB port (separate USB cable required). Your model's flight can then be graphed and displayed with our powerful software, or visualized (either in real time or after your flight) with Google Earth!

* **Four Channel A/V Distribution** - Ever wish you had more video/audio outputs? The RVGS has four built-in outputs! Outputs are independently buffered so levels are not affected by how many devices you plug in

* **LCD Display** – already included. Easy setup antenna tracker and real-time GPS position is

* **Two video inputs** -NTSC/PAL, using your video receivers of any frequency. Video Input 2 is adjustable to match Video Input 1. Note that only one input needs to be used, if you are not using the Diversity feature.

* **Two audio inputs** - Two monaural audio inputs are supported. Note that only one input needs to be used, if you are not using the Diversity feature.

* **Four A/V outputs** - Four video outputs (75 ohm) and four "line level" audio outputs

* **Power Input** - Power input range 7V to 14V MAX. but it has to work with 3S battery

* **Two Servo Outputs for pan and tilt trackers** - Unit is capable of delivering 5A burst output to drive even large pan/tilt servos.

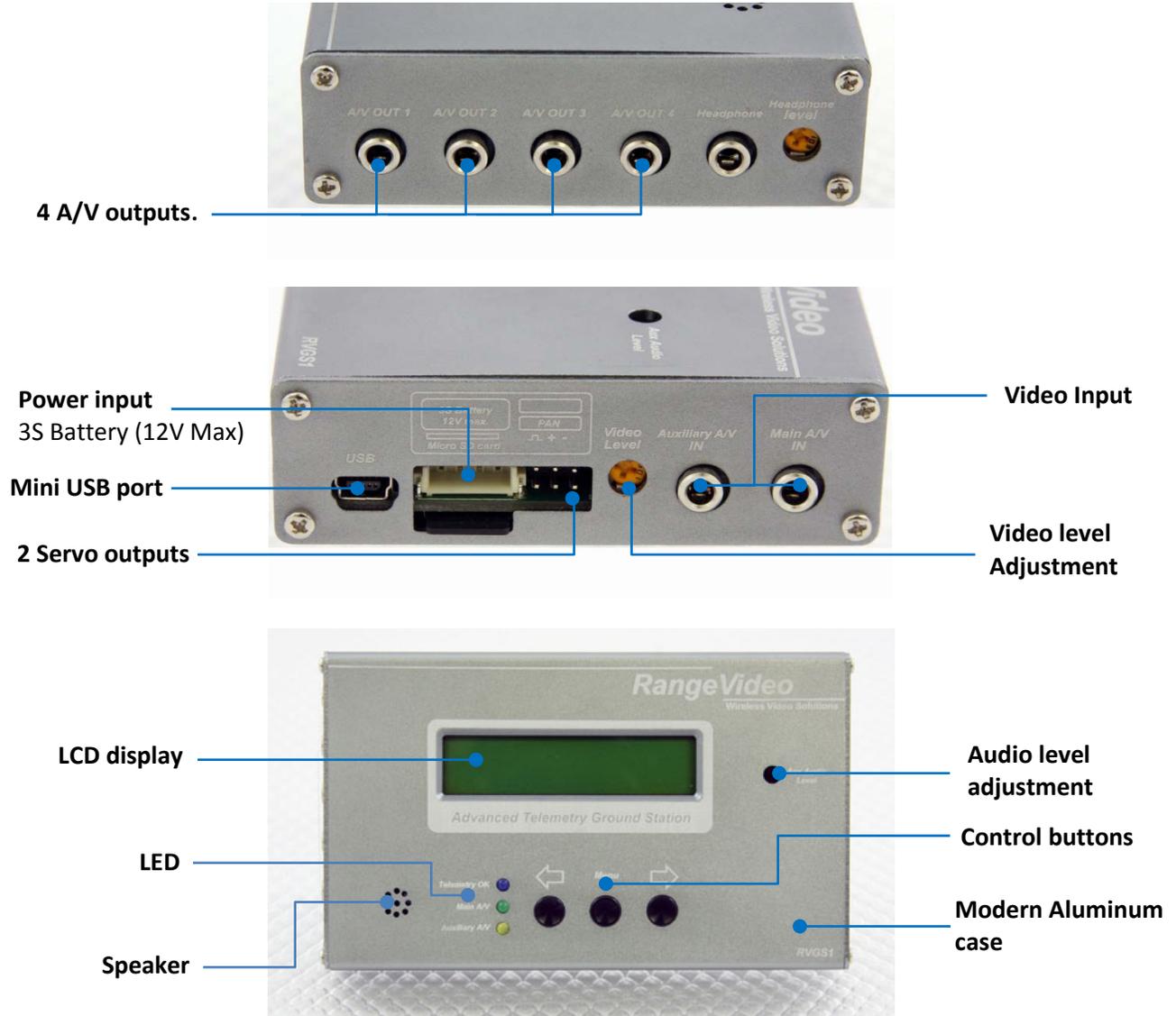
* **USB Port for connecting to PC**, for live PC display of telemetry and firmware update. Note: A standard USB "Mini-B" cable is required for these features, but not included.

* **Modern Aluminum Case**

automatically displayed.

Portable – uses 3S poly batteries.

Inputs & Outputs



What's included

1. 3.5mm to RCA video/audio cable 37" – 2
2. 3.5mm to RCA video/audio cable 18" – 4
3. Antenna tracking unit – 1
4. Box and First time use instruction - 1



Additional requirements (Not included)

- A suitable battery or power supply
- A standard "Mini" USB cable is not included, but is required to keep your unit updated to the latest firmware. Most likely, you already have a Compatible USB cable.
- To use the tracking function, a pan/tilt antenna mount with servos is required.
- To use the tracking and telemetry functions, RVOSD System is required.
- A small Phillips or flathead screwdriver is required to rotate the adjustment potentiometers.

First use configure

RVGS is really simple to use. Just plug one or two video receivers to the inputs and monitor or video glasses to one of the outputs. Make sure there is a valid signal on input(s).

Plug the balance connector of a 3S battery to RVGS and it should start with a beep. By pressing the arrow buttons you should be able to cycle the screen thru the different flight parameters. Audio and video of the auxiliary video input can be attenuated by using a side and front trimmers, you have to use a small screwdriver for this. So is the best if you plug the video receiver with higher signal level output on the auxiliary input. If both receivers have equal signal level outputs then you can use either input of RVGS.

The four A/V outputs are independently buffered so levels are not affected by how many devices you plug in. There is also a trimmer to adjust internal speaker or headphones audio level.

There are two servo outputs for antenna tracker. RVGS has an internal switched regulator that is rated to supply 5V 5A peaks and 3A continuous to the servos. After plugin the servo outputs you can start the calibration of the tracking. This has to be done at the flying field for proper operation.

Follow this steps to setup RVGS for the first time:

1-Press "action" button for more than 2 seconds. Antenna tracker calibration should start by showing the Menu item "Pan servo 90° CCW".

- 2-Set it to 0, adjust mechanical linkage of pan servo so antenna face the "front", centered mechanical setup.
- 3-After mechanical setup, increase or decrease the value with minus or plus buttons, so the antenna change pan orientation to 90° CCW(counter clock wise).
- 4-Press "action" button again. Menu item "Pan servo 90°CW" will show.
- 5-Increase or decrease the value with minus or plus buttons, so the antenna change pan orientation to 90° CW(clock wise).
- 6-Press "action" button again. Menu item "Max allowed pan" will show.
- 7-Increase or decrease the value with minus or plus buttons, to set the maximum allowed pan travel to each side (+-90 to +-180°)
- 8-Press "action" button again. Menu item "Servo tilt 0°" will show. Set it to 0, adjust mechanical linkage of tilt servo so antenna face the "front", centered mechanical setup.
- 9-Increase or decrease the value with minus or plus buttons, so the antenna change tilt orientation to 0° (flat).
- 10-Press "action" button again. Menu item "Servo tilt 90°" will show.
- 11-Increase or decrease the value with minus or plus buttons, so the antenna change tilt orientation to 90° (up).
- 12-Press "action" button again. Menu item "Tilt lower limit" will show.
- 13-Increase or decrease the value with minus or plus buttons, to set the minimum allowed tilt travel to the lower side.
- 14-Press "action" button again. Menu item "Heading offset" will show.
- 15-Make sure the OSD has the "home" set while it is closest possible to the antenna tracker. Move the airplane 20mts to the direction the front of the antenna tracker is facing.
- 16-Push minus or plus buttons, to set. This will make the antenna tracker know the orientation of its front. You have to repeat this procedure each time you change antenna tracker front side orientation.
- 17-Press "action" button again. Menu item "Pan servo speed" will show.
- 18-Push minus or plus buttons, this will set pan servo travel speed.
- 19-Press "action" button again. Menu item "tilt servo speed" will show.
- 20-Push minus or plus buttons, this will set tilt servo travel speed.
- 21-Press "action" button again. Menu item "exit & save" will show.
- 22-Push minus or plus buttons, this will exit and save configurations.

Make sure RVOSD always set home as close as possible to the antenna tracker.

Antenna Tracking

This section describes the antenna tracking function of RVGS ground station. This function requires the RVOSD system, and a servo based antenna panning or pan/tilt mount (tracker).

What the Tracking Function Does

The tracking function points a pan/tilt capable antenna tracker directly towards your model, based on the position of the model in relation to home. RVGS drives the pan and (optionally) tilt servo of your tracker.

How to Set Up the Antenna Tracking Hardware

Please see **First use configure** section

Diversity

This section describes the diversity function of RVGS ground station. This function can be used with or without the RVOSD system.

What the Diversity Function Does

The diversity function constantly inspects the signal quality of two A/V receivers connected to the input channels of the RVGS, and switches to the highest quality signal. The two receivers can be either NTSC or PAL. RVGS automatically detects the video mode. Video links of any frequency can be used, or can even be mixed if transmitters of two different frequencies are used on the model.

The diversity function can help to eliminate loss of video signal due to “multipath” that often occurs with a single receiver. If you are using two receivers, it is more likely that at least one of them will be in a good position at any given time.

Further, if you use a directional antenna for flying at longer range, that antenna may not work well when you are close to your takeoff point. To solve this problem, many pilots use an omnidirectional antenna when close in, and a directional antenna when flying far away. If both of these receivers are connected to RVGS, the diversity function will pick the stronger of the two automatically.

How to Set Up the Diversity Function

To set up the diversity function, simply connect two receivers to RVGS Primary and Secondary A/V inputs, as described in the “Connections” section above. The Green & Yellow LEDs on front panel will indicate that RVGS receive video signal and diversity function is ON.

If you notice that the video images of the two input channels do not match in appearance, “Video level” potentiometer can be used to adjust the Video input levels. A small screwdriver is required to rotate the potentiometer.

CAUTION: rotate the potentiometers gently, and do not rotate the potentiometers past their stops. They do not rotate 360 degrees! Forcing the potentiometers past their stops could damage RVGS board.

Telemetry Software in Use (download)

Software	Download Link	Description
Pascal GS Software	Download software	 <p>Simple software to record your live flight.</p> <ul style="list-style-type: none"> - Playback function. - Export xml data to GoogleEarth <p>Important: works only with Airbender protocol.</p>
Happy Kilmore GS software	Download software	 <p>Open source ground control station which accepts NMEA, SiRF, uBlox, MediaTek, ArduPilot, ArduPilot Mega, ArduIMU binary, MAVlink, FY21AP II and UavDevBoard's MartixPilot as data input. Graphical user display including Google Maps/Earth interface and live video feed.</p> <p>Important: Works only with HappyKilmore protocol</p>

The Telemetry Function

The RVGS, when coupled with our Windows Data Recorder software program (such as **Rvgs Telemetry Or Happy Kilmore GS software**), provides telemetry display of all data from RVOSD. In addition to displaying the telemetry, the software can save the telemetry to a file for later use, graph the telemetry data in real time or post flight, and show the GPS telemetry data in Google Earth™. An example of the telemetry software screen is shown above. To utilize the telemetry function, just connect a USB mini-B cable (not included) between your PC, notebook, or netbook, RVGS. Then, make sure telemetry is being received by RVGS – the “Telemetry” LED should be flashing. Next run the software. Then, telemetry data should be displayed on the Data Recorder screen.

NOTE: make sure that you have connected RVGS to USB before powering RVGS with battery, for proper USB operation.

F.A.Q (Frequently asked question.)

Q: Do I have to go through all procedures again if I change orientation of the RVGS (facing north first time and the next time facing south.)

A: No you don't have to go through all procedures. All you need to do is redo the heading offset configuration.

Q: If I am using the same front side all the time, do I need to do the whole setup each time I go out, or just the heading offset

A: If you use the antenna tracker on the same place and same orientation you don't have to change the heading offset, you don't have to do any new configuration at all.

Q: What is "Max allowed pan"

A: "Max allowed pan" will set pan +/- from centered position. So setting it for 160° will make the antenna to pan +/-160° from center, a total of 320°.

Q: What's the max voltage the RVGS can hang with? My lead acid batteries max voltage is 13.5 volts. Is that ok?

A: Max Voltage is 16V, but low voltage alarm is fixed to 10.5V.

Q: what is the voltage input range for the RVGS? I'm just wondering whether i need to provide a regulated 12v.

A: It is supposed to be powered by a 3S battery, no need for regulator.

Q: There is a Micro SD Card Slot? I haven't found any reference to that in this thread or in the introductory video..

A: SD card slot is not working at this moment.

Q: The telemetry information to the Ground Station... comes from audio or from video? And what should happen if you lost the video signal by accident (the cable goes out, in example)? Do you lost also the telemetry information?

A: Telemetry works by video, if video cable goes out, then you also lost the telemetry.

Q: Is the ground station could be compatible with other OSD that also send the telemetry embedded in the video.... Is there a "standard" to send the telemetry to the ground station?

A: No, it's not compatible. It's using own protocol for telemetry.

Q: How can I get 360 degree rotation out of the pan?

A: just set max pan to 180° = +/-180° from center position.

Q: what happens when the ground station loses the video signal, effectively losing telemetry? Will the GS save or continue to display the last known GPS coordinates?

A: It will display data from the last good telemetry received. So as long as you don't power off the GS you can check the coordinates.

Q: I am using a 3 pin stereo cable in both ends. This cable came with the Diversity box. Is it compatible? Can I use it with RVGS?

A: No, It's Not compatible. It has different Pin-Out.

Q: How can I record video from RVGS

A: Just use two plugs wires that included in the package. Connect them straight from RVGS to recorder. Video will be clear and clean. No additional video Amp after RVGS is needed.

Q: which antenna pan tilt mounts are recommended to work with RVGS?

A: Please check ServoCity.com for servos

Q: Sometimes I get a continual beeping on the audio channel and was wondering if this is a low voltage alarm.

A: Yes It's LOW VOLTAGE ALARM: It starts beeping at 10.5V and under.

Q: What happens if during flight, the power to the RVGS1 is suddenly interrupted, and then powered again after 10 seconds, but the video and telemetry are still good. Does it need to be recalibrated?

A: No. It will resume tracking immediately.

Q: what voltage RVGS puts out the pan/tilt servos on our pan/tilt antenna tracker

A: 5V and 1.5A combined of the 2 outputs (pan and tilt). Better use a direct connection from the batt (or via a voltage regulator) to power your high voltage, high amp, high torque digital servo's. *So, + and - from batt to servo. PPM and - from RVGS to servo.*

Q: Does RVGS bind to RVOSD during the flight if there are more the one GS and RVOSD nearby?

A: No it will not in current firmware. Next update of firmware should have this feature.

Q: Will RangeVideo GS work without audio cable connected?

A: Yes. It just needs the video to extract the GPS data.

Q: Is RVOSD essential for RVGS, or is it possible that it works with another OSD System?

A: No. RVGS designed and optimized to work with RVOSD only.

Q: Does the RVGS Diversity works with RSSI?

A: RVGS Diversity does not use RSSI for switching, it is based on video signal instead.

Q: Can i use a servo expander for 90° pan usage?

A: Use a winch servo for pan, regular servos will not do +-90° pan. And if you use a servo expander could be non-linear. Or watch video to mod your own servo. Here is a sample <http://www.youtube.com/watch?v=KUvjCHdq3JA> or this too <http://www.youtube.com/watch?v=Hst0hrpPCTg>

Q: RVGS Antenna Traker works with GPS coordinates from RV-OSD? or RSSI signal

A: RVGS Antenna Tracker takes GPS coordinates from RVOSD.

Troubleshooting

Problem	Solution	
RVGS plugged into a PC but device is not recognized or respond.	<p>As soon as RVGS connected to PC it should start installing the driver.</p> <ol style="list-style-type: none"> 1. Check in the Device Manager if the device installed in the list. <p>Sometimes it takes longer than usual to recognize the device. Just wait up to 30-40 sec.</p> <ol style="list-style-type: none"> 2. If device not exist in the Device Manager then try to change USB cable. 3. If other cable did not fix the problem then it probably issue with USB port. 	Send it back for repair
The Data is displayed on RVGS LCD screen but not in Pascal GS software or HappyKilmore software.	<ol style="list-style-type: none"> 1. Try using another computer 2. Try using different OS XP, Vista or 7. 3. Switch between protocols Airbender or H. Kilmore Airbender works with RV Telemetry only. 4. Try to change USB cable 5. When you connect RVGS to PC it supposed to recognize it, if not most likely defective USB port. 6. Change regional settings in the settings of your OS 	Ship it for repair
When servos pan/tilt plugged in to RVGS, the GS turns on/off at about 1/4 second intervals.	use a separate power source for the pan/tilt servo	

Got questions or feedback?

1. Please visit our Community for more information: <http://rangevideo.com/forum>

Firmware updates

Not available at this moment

For Developers

RVGS will put this data on the Virtual COM port over USB:

If selected to Airbender output

```
$1,1,00040291,00.000000,N,000.000000,W,+00000,+00000,000,0000,0000,000,+000,000,089,089,089,089,1160,0000,00004,0004,00,000,0026,0,*12
```

It is sent 25 times/S, 115200, 8N1.

\$

Validity (1 valid, 0 invalid)

diversity (1 main, 2 aux)

HHMMSSmm (hour|minutes|seconds|tenth of seconds)

ddmm.mmmm, N/S (Latitude)

dddmm.mmmm,E/W (Longitude)

+/- altitude (relative)

+/- altitude (absolute)

Roll (0 to 255)

Pitch (0 to 4096)

Airspeed

GroundSpeed

+/- Variometer

Heading (0 to 360)

Rudder

Elevator

Aileron

Throttle (mS / 100)

Main battery voltage

Aux battery voltage (V * 100)

Current

mAh

Sats

RSSI

Temp

Home set|unset, 1|0

*

checksum

Checksum is everything XORed from "\$" to "*" but not including those. The unit does have an LCD display, but no SD card. the log is made by the GS software, exporting to CSV file.

This is for the ground station to pc comms only. The telemetry data is validated by CRC32 for over the air transmission.

If selected to Happy Killmore output:

\$RV1,1,00040291,00.000000,N,000.000000,W,+00000,+00000,000,0000,0000,0000,+000,000,089,089,089,089,1160,0000,00004,0004,00,000,0026,*0A

It is sent 25 times/S, 115200, 8N1.

\$

Validity (1 valid, 0 invalid)

diversity (1 main, 2 aux)

HHMMSSmm (hour|minutes|seconds|tenth of seconds)

ddmm.mmmm, N/S (Latitude)

dddmm.mmmm,E/W (Longitude)

+/- altitude (relative)

+/- altitude (absolute)

Roll (0 to 255)

Pitch (0 to 4096)

Airspeed

GroundSpeed

+/- Variometer

Heading (0 to 360)

Rudder

Elevator

Aileron

Throttle (mS / 100)

Main battery voltage

Aux battery voltage (V * 100)

Current

mAh

Sats

RSSI

Temp

*

checksum

Checksum is everything XORed from "\$" to "*" but not including those.